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### Recommended Citation

Oxoby, RJ and Spraggon, J, "Mine and yours: Property rights in dictator games" (2008). *Journal of Economic Behavior & Organization*. 149.

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# Mine and yours: Property rights in dictator games

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Received 18 March 2004; received in revised form 25 April 2005; accepted 31 December 2005

Available online 25 October 2006

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## Abstract

We conduct experiments on earned wealth effects in dictator games. In addition to a standard treatment in which wealth was determined by the experimenter, we conduct treatments in which the dictator or the receiver earned the wealth used in the dictator game. In our baseline treatment, on average, dictators allocate receivers 20 percent. In treatments where dictators earned wealth, we observe the (theoretically predicted) zero offers to receivers. In treatments where receivers earned wealth, we observe distributions of offers in which receivers' shares exceeds 50 percent. These results emphasize the importance of property rights in determining individuals' social preferences.

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*JEL classification:* C70; C91; D63

*Keywords:* Dictator games; Property rights; Social preferences

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## 1. Introduction

Experiments have demonstrated the presence of other-regarding or social preferences in which individuals reveal a preference over not only their own payoffs, but also those of others. For example, in simple dictator games where standard theory predicts zero offers to receivers, senders typically offer in excess of 20 percent of their endowments (see Camerer, 2003). These results are strikingly robust across varying degrees of anonymity (Hoffman et al., 1996) and different cultures (Henrich et al., 2001; Roth et al., 1991). The insights gleaned from these experiments

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have motivated various theoretical approaches characterizing social preferences (Bolton and Ockenfels, 2000; Charness and Rabin, 2002; Fehr and Schmidt, 1999) and the intentions underlying individual behavior (Dufwenberg and Kirchsteiger, 2004; McCabe and Smith, 2000; Rabin, 1993).

However, experimental participants' displayed preferences for fairness, reciprocity, and social welfare are multi-faceted, motivated by many aspects of the decision environment and the context of interactions. As evidence, recent research has demonstrated how individuals' attention to the payoffs of others are influenced by antecedents in the decision environment. For example, Hoffman and Spitzer (1985) and Hoffman et al. (1994) find that when individuals must earn their roles in an experiment (e.g., earning the role of seller or first mover), the distribution of payoffs reflects the fact that roles were earned. Thus, by having earned a position or role in an experiment, participants appear to think that one is entitled to outcomes which, in other circumstances, may be considered unfair. With respect to these perceived entitlements, Cherry et al. (2002), Cherry (2001) and Ruffle (1998) find that payoff distributions in dictator and ultimatum games are influenced by the source of wealth: individuals with *legitimate* claims to assets (having earned these assets) receive larger shares than when endowments are determined by the experimenter (i.e., unearned). This demonstrates how individuals' perceptions of fairness and their attention to the payoffs of others are attuned by behaviors leading up to (and the characteristics of) a decision environment.<sup>2</sup>

Here, we conjecture that the legitimizing of assets creates property rights which participants' observe, regardless of who accumulates these rights. We test this conjecture in a series of dictator games in which one party (either the dictator or the receiver) must earn the wealth used in the game. Thus, our design includes that of Cherry et al. (2002, in which only dictators earned money) as a special case. On the other hand, when receivers must earn money, our treatment mirrors a trust game akin to that of Berg et al. (1995) in which a receiver's exertion of (costly) effort indicates trust in the dictator not expropriating wealth via a zero offer. Results from our earnings treatments are compared to a standard (unearned wealth) dictator game treatment.

We find that property rights (created by legitimizing assets) play a crucial role in individuals' revealed preferences over outcomes. In contrast to the standard dictator game, we observe the theoretically predicted zero offer in treatments where dictators earn wealth. Alternately, when receivers earn wealth dictators allocate significantly more, observing the entitlements or property rights created by receivers' productivity. Indeed half of the dictators return at least the amount produced through receivers' efforts. We attribute these decisions to the strength of asset legitimacy in creating observed property rights among participants, a characteristic of the decision environment which appears to augment other-regarding or social preferences.

We proceed as follows: Section 2 outlines our experiment. As a benchmark, we conduct a canonical dictator game under anonymity against which we measure our other results. Section 3 presents our results. Section 4 discusses our results in terms of recent research on fairness, the legitimacy of assets, and equity theory.

## 2. Experimental design

We conducted dictator games with 168 pairs recruited from the student body at the University of Calgary. Participants were randomly divided into two groups (A and B) with each group arriving

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<sup>2</sup> Similar results are obtained by Bolton et al. (2005) and Gantner et al. (2001).

at different times and assigned to separate rooms.<sup>3</sup> Participants remained in their assigned rooms for the experiment's duration, and each group was dismissed from the experiment at different times. The objective of these procedures was to eliminate any contact between participants.

### 2.1. Earnings treatments

To create a sense of asset entitlement or legitimacy, some subjects participated in an earnings stage prior to the dictator game. In our *receiver earnings treatment* ( $n = 83$ ), individuals in group B had the opportunity to generate (i.e., earn) money based on their performance on a 20 questions exam culled from the Graduate Management Admissions Test (GMAT) and the Graduate Record Examination (GRE). Specifically, if an individual correctly answered between 0 and 8 questions, CAN\$ 10 was generated; if she correctly answered between 9 and 14 questions, CAN\$ 20 was generated; and if she correctly answered 15 or more questions, CAN\$ 40 was generated.

Individuals in group A arrived at a different location 45 min after group B. Individuals in group A were provided with a copy of the exam taken by those in group B and the corresponding payment schedule. Each individual in group A was randomly paired with an individual in group B and informed of the amount of money generated by this person. Individuals in group A were not informed of the exam score of this person, only the corresponding monetary amount. Individuals in group A were then asked to allocate this earned wealth in a one-shot dictator game, deciding how much of the money generated by an individual in group B would be kept for themselves and how much would be returned to the individual who had earned the money.

In our *dictator earnings treatment* ( $n = 24$ ), individuals in group A took the exam and faced the aforementioned earnings structure. Earned wealth was used in the second stage where group A individuals made offers to group B individuals who arrived 45 min later at a different location.

In our *baseline treatment* ( $n = 61$ ), no exam was administered and group A dictators were randomly assigned wealth levels of either CAN\$ 10, CAN\$ 20, or CAN\$ 40 to allocate between themselves and group B receivers. Groups A and B individuals knew wealth levels were randomly determined. This followed previous experiments in which wealth was determined by the experimenter.

## 3. Results

To begin, we consider the theoretical predictions from the above games. In all three treatments, standard theory (based on pure self-interest) predicts that the dictator will allocate nothing to the receiver. Hence, in the dictator earnings treatment, we expect dictators to produce as much wealth as possible. In the receiver earnings treatment one would expect individuals in group B to produce the lowest wealth level possible.<sup>4</sup>

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<sup>3</sup> Instructions and supporting materials are included in Oxoby and Spraggon (2004), available online. Our protocols were adapted from those of Hoffman et al. (1996). To avoid semantic pointers, instructions refrained from using the word "earned" to describe the money used in the dictator game.

<sup>4</sup> There are at least three potential reasons that group B receivers may exert effort to produce wealth greater than CAN\$ 10. First, receivers may believe that dictators will recognize and respect their property rights over wealth created by their productivity on the exam. Second, receivers may have preferences over efficiency (maximizing total group payoff) as suggested by Charness and Rabin (2002) and Engelmann and Strobel (2004). Third, receivers may enjoy the challenge of taking the test and may do well because they are good "test takers." We are unable to distinguish between these three explanations for why subjects may do better on the test. As a result we refer to a subject who does better on the test and produces a higher wealth level as being more productive.

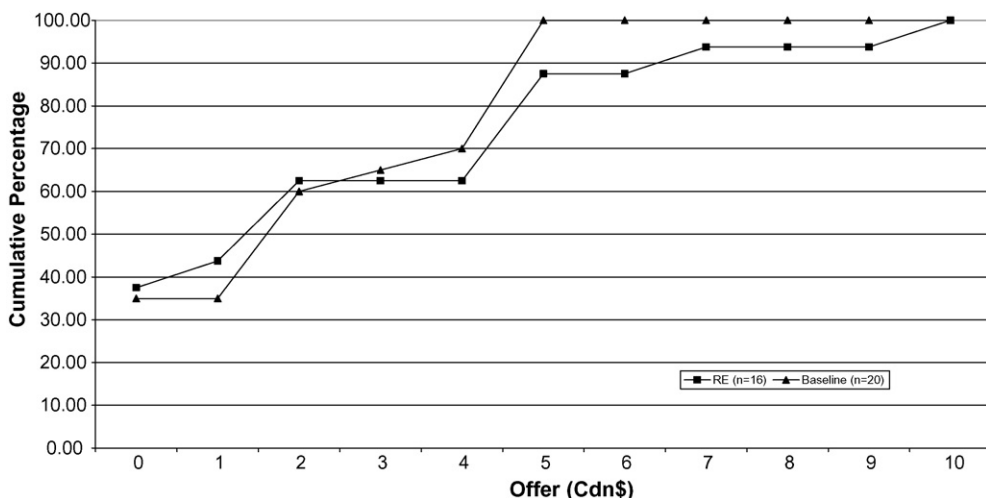


Fig. 1. Cumulative distributions of offers in the CAN\$ 10 dictator games.

Table 1  
Percentage offers by treatment and wealth level

Wealth (CAN\$)	Mean (percent)	Median (percent)	Offers between (percent)			
			0 percent	1–49 percent	50 percent	51–100 percent
Baseline dictator treatment						
10	23.5 (4.717) [20]	20	35.00	35.00	30.00	0
20	20.22 (3.604) [23]	25	26.09	60.87	13.04	0
40	20 (3.776) [18]	18.75	11.11	77.78	11.11	0
Receiver earnings treatment						
10	27.5 (7.665) [16]	20	37.50	25.00	25.00	12.50
20	46 (4.220) [35]	50	2.86	40.00	25.71	31.42
40	63.83 (3.663) [32]	75	0.00	15.63	15.63	62.86

Standard errors are in parenthesis and number of observations are in square brackets.

The cumulative distributions of offers by wealth level (CAN\$ 10, CAN\$ 20, and CAN\$ 40) are presented in Figs. 1–3.<sup>5</sup> Fig. 4 compares the cumulative distributions across the three different wealth levels for the receiver earnings treatment. Table 1 presents mean, median and percentage offers from our baseline and receiver earnings treatments, and Table 2 provides the *p*-values for Mann–Whitney tests on pair-wise comparisons of treatment cells.

In the baseline dictator treatments, the theoretically predicted “zero offer” occurred in 35 percent of CAN\$ 10, 26 percent of CAN\$ 20, and 11 percent of CAN\$ 40 wealth levels. This is consistent with previous dictator game experiments (see Table 2.4 in Camerer, 2003, p. 57). Our dictator earnings treatment follows the theoretic prediction perfectly: 100 percent of dictators allocated nothing to receivers (Figs. 3 and 4). This demonstrates the robustness of the results in

<sup>5</sup> RE represents the receiver earnings treatment, DE represents the dictator (sender) earnings treatment, and baseline represents the baseline (i.e., unearned wealth) treatment. We had no CAN\$ 10 wealth levels for the dictator earnings treatment; all dictators in this treatment earned at least CAN\$ 20.

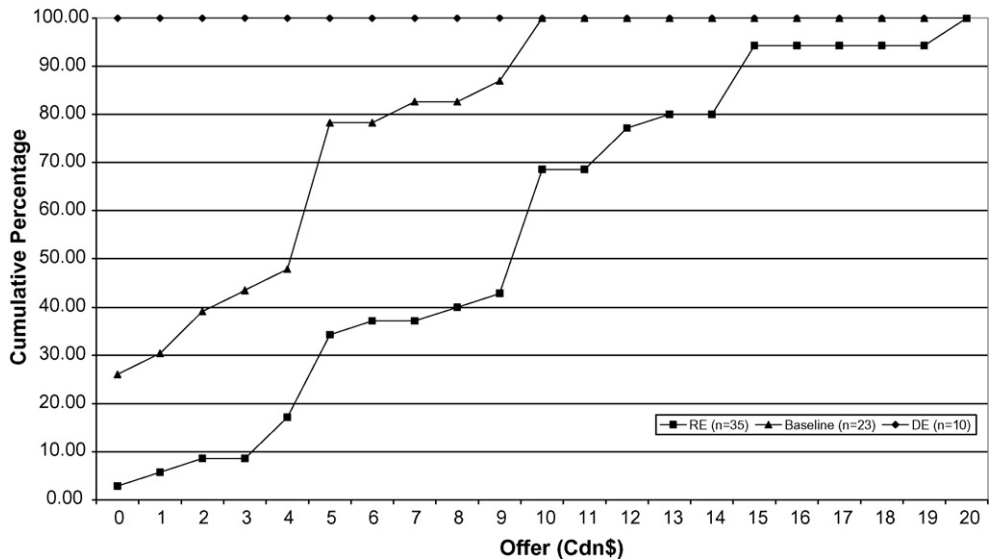


Fig. 2. Cumulative distributions of offers in the CAN\$ 20 dictator games.

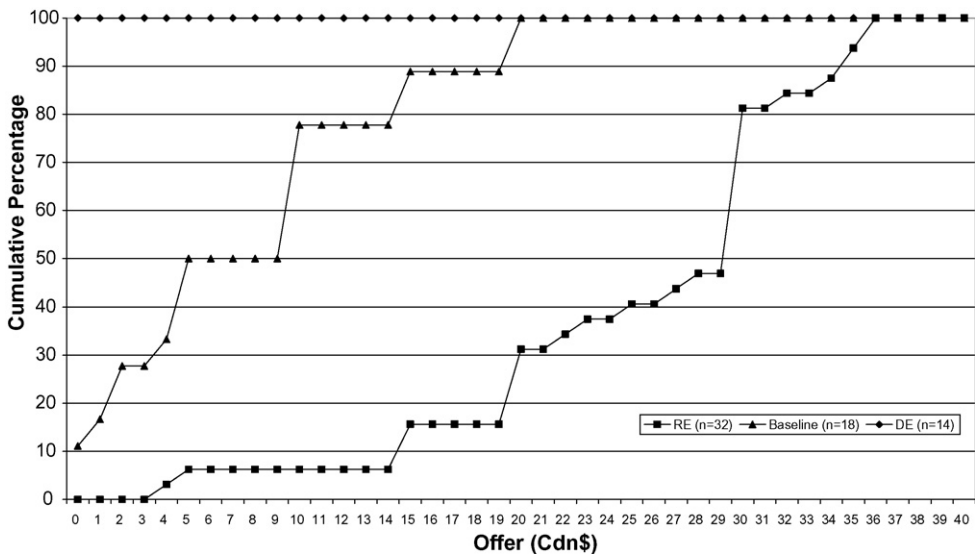


Fig. 3. Cumulative distributions of offers in the CAN\$ 40 dictator games.

Cherry et al. (2002): legitimizing dictators' claims over wealth increased the occurrence of the theoretic prediction over the baseline treatment.<sup>6</sup>

Results from our receiver earnings treatment further demonstrate the importance of legitimate property rights. To the extent that legitimizing assets created property rights, dictators in group

<sup>6</sup> Moreover, none of our dictators in the dictator earnings treatments scoring less than 9 (the CAN\$ 10 wealth level cut-off) suggests that they exerted significant effort on the test.

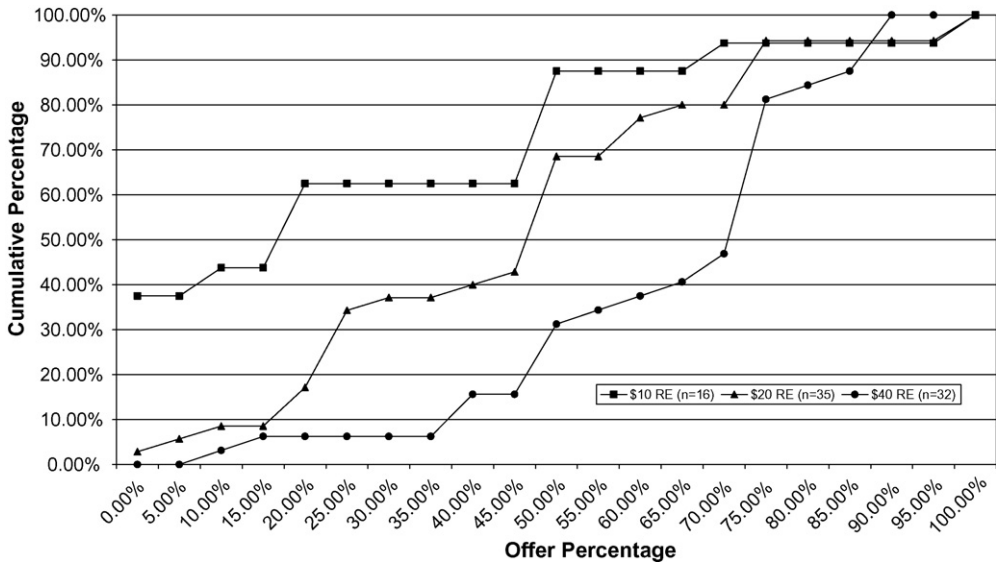


Fig. 4. Cumulative distributions of offers in the receiver earnings treatments.

A observed the rights of those in group B by extending larger offers and, in some cases, offering the entire amount of the money earned by the individual (i.e., 100 percent offers). Thus, legitimizing the *receiver's* claim to the wealth via the earnings stage dramatically *reduced* dictators' self-interested behavior, with zero offers arising in none (0 percent) of the CAN\$ 40, one (3 percent) of the CAN\$ 20, and six (38 percent) of the CAN\$ 10 wealth levels. This mirrors the effect of asset legitimacy seen in our dictator earnings treatment: the property rights created by legitimizing assets yielded offer distributions which, relative to the baseline treatment, reflected these rights.

Mann–Whitney tests indicate that there is a significant difference in the distributions of offers (Figs. 2–4) between the receiver earnings and baseline treatments for the CAN\$ 20 wealth level (MW  $p < 0.01$ ) and CAN\$ 40 wealth level (MW  $p < 0.01$ ), but not for the CAN\$ 10 wealth level (MW  $p = 0.88$ ). That there is no significant difference between the baseline and receiver earnings treatment for the CAN\$ 10 wealth level emphasizes the role of legitimized property rights: receivers who do not exert a verifiable level of effort are treated in the same way as receivers in the baseline treatment. This is consistent with results in Berg et al. (1995) and McCabe et al. (2003):

Table 2  
Non-parametric test summary

	Baseline dictator			Receiver earnings (RE)		
	CAN\$ 10	CAN\$ 20	CAN\$ 40	CAN\$ 10	CAN\$ 20	CAN\$ 40
Baseline CAN\$ 10		0.8130	0.9056	0.8813	0.0013	0.0000
Baseline CAN\$ 20			0.8620	0.8726	0.0001	0.0000
Baseline CAN\$ 40				0.9582	0.0003	0.0000
RE CAN\$ 10					0.0129	0.0001
RE CAN\$ 20						0.0017
RE CAN\$ 40						

Mann–Whitney  $p$ -Values.

when dictators observed no verifiable evidence of receivers' trust (here, earnings effort in the face of potential expropriation), dictators do not reciprocate (i.e., extend larger offers) as with higher wealth levels. This observation is evident in [Table 1](#) where, in the baseline treatment, there are no offers in excess of 50 percent.<sup>7</sup> This stands in sharp contrast to the behavior of dictators in the receiver earnings treatments where 13 percent, 31 percent, and 63 percent of dictators extended offers exceeding 50 percent for the CAN\$ 10, CAN\$ 20, and CAN\$ 40 wealth levels.

Building on these results, recall that receivers in our receiver earnings treatment were allocated a minimum of CAN\$ 10 (the minimum amount they could receive when scoring between 0 and 8 on the exam). Thus, one may interpret earnings as the wealth generated over and above CAN\$ 10. The fact that some receivers exerted any effort on the exam suggests that receivers expected dictators to observe their property rights and behave reciprocally towards exam performance by extending a larger offer than they would have had if earnings had been lower.<sup>8</sup> Interpreting the receiver earnings treatment in this way, it is notable that the modal offer is 50 percent for the CAN\$ 20 wealth level and 75 percent for the CAN\$ 40 wealth level, *exactly the amount that the receiver earned over and above the CAN\$ 10 allocated by the experimenter*. These differences are discernable in the distribution of offers ([Fig. 4](#)) and are supported by non-parametric tests ([Table 2](#)). This suggests that the observation of property rights is limited to the extent that the legitimacy of these rights is verifiable. That is, only when receivers earned CAN\$ 20 or CAN\$ 40 were dictators sure that receivers' property rights were not simply determined by the experimenter. These wealth levels provided dictators with evidence that these rights were legitimate in that the receiver had increased the wealth available for the dictator to allocate.

Notice that in the receiver earnings treatment dictators could have interpreted the CAN\$ 10 wealth level as evidence that a receiver had shirked on the exam. It is therefore interesting that the distribution of offers in the CAN\$ 10 receiver earnings and CAN\$ 10 baseline treatments are not statistically different ([Fig. 1](#) and [Table 2](#)), implying no evidence of negative reciprocity in our data. This results stands in contrast to intentions-based theories (e.g., [Dufwenberg and Kirchsteiger, 2004](#)) and menu-dependence ([Bolton et al., 2005](#)) which suggest that receivers would receive less for only having generated CAN\$ 10 (rather than CAN\$ 20 or CAN\$ 40). Thus, our results differ from [Ruffle \(1998, p. 252\)](#) where "losing recipients are mildly punished." A potential explanation for the absence of negative reciprocity in our results may be the confounding of effort and ability in dictators' interpretation of receivers' earnings. That is, upon encountering a receiver who generated only CAN\$ 10 on her exam, a dictator could not be sure if this score was the result of low effort or low ability on the part of the receiver. Reciprocity based on punishing low effort but not low ability may have reduced dictators' desire to extend low offers to poor performing receivers.<sup>9</sup>

#### 4. Discussion

Property rights and asset legitimacy play a crucial role in decision-making, weighting and characterizing individuals' attention to the payoffs of others. Thus, the implications drawn from

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<sup>7</sup> This is also true in the baseline treatments from [Cherry et al. \(2002\)](#) and [Ruffle \(1998\)](#). Other dictator experiments observe a small number of offers in excess of 50 percent. See [Andreoni et al. \(2003\)](#) and [Forsythe et al. \(1994\)](#).

<sup>8</sup> As noted earlier, alternate explanations include that receivers have preferences over efficiency ([Charness and Rabin, 2002](#); [Engelmann and Strobel, 2004](#)), or that receivers enjoy the challenge of taking the test.

<sup>9</sup> Refraining from punishing low ability is consistent with the "accountability principle" discussed in [Konow \(2000\)](#). Also see [McClintock and Keil \(1982\)](#) and [Walster et al. \(1978\)](#).



more standard bargaining experiments regarding fairness concerns and inequity aversion should be tempered against the influence of “found money” effects (Arkes et al., 1994; Thaler, 1999). As demonstrated by our experiment and elsewhere, legitimizing assets can alter the ways in which individuals construe equity and fairness, resulting in behaviors that appear to defy or magnify the presence of social preferences.

In our experiment, we observe a dichotomous effect of earned wealth in the dictator game. First, individuals’ own entitlements to assets appear to dominate over the fairness concerns characterized in outcome based models of other-regarding preferences (Bolton and Ockenfels, 2000; Fehr and Schmidt, 1999). Secondly, others’ entitlements to assets appear to amplify individuals’ observed adherence to the positive reciprocity characterized in intention-based models of fairness (Dufwenberg and Kirchsteiger, 2004; Rabin, 1993). Indeed, receivers’ earning efforts reveal an expectation that dictators will observe the property rights implied by these efforts. Thus, our experiment demonstrates how earned wealth effects influence outcome based fairness (which disappears in our dictator earnings treatment) and intention based fairness (which appears to be heightened in our receiver earnings treatment).

Legitimizing assets creates property rights which individuals in our experiments observed, complementing the dictator experiments of Cherry et al. (2002) and Ruffle (1998). In Cherry et al. (2002), dictators (not receivers) earned wealth via a 17 question exam. Legitimizing assets in this way resulted in 70 percent (US\$ 40) and 79 percent (US\$ 10) support for the theoretical zero offer.<sup>10</sup> In Ruffle (1998) receivers were ranked by their performance on a general knowledge quiz, with participants scoring above the median allocated US\$ 10 and the remainder allocated US\$ 4. As in our results, Ruffle (1998) finds that offers made to receivers in the top of the score distribution (mean offer 45 percent) exceed those made to receivers in the bottom of the score distribution (mean offer 23 percent) and offers made in treatments in which endowments were randomly assigned (mean offer 34 percent).

Our results provide stronger evidence as to the role of legitimized property rights in decision-making. We conjecture that the strength of our results (particularly mean offers exceeding those in Ruffle, 1998, see Table 1) is due to earnings based on absolute (rather than relative) performance and the size of incentives. In particular, the use of absolute score to determine earnings implies that (in our context) dictators have a stronger signal of receivers’ legitimate claim to assets. This yields strong evidence of the importance of property rights (and the ensuing “gratefulness” of dictators in respecting these property rights) in determining behavior. That receivers who produced greater wealth were rewarded for this productivity, and the absence of any difference between offers made to receivers earning CAN\$ 10 and our CAN\$ 10 baseline treatment, indicates that dictators’ observation of property rights only affected decision-making when there was ample evidence of receivers’ legitimacy over assets.<sup>11</sup>

Equity theory provides a potential explanation for our results. According to equity theory, people desire outcomes which they consider just, where a “just outcome” is measured both in terms of the “output” of a given decision environment and the “inputs” giving rise to the decision

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<sup>10</sup> In our design, legitimizing assets on the part of the sender results in 100 percent support for the theoretical prediction. Cherry et al. (2002) find 95 percent support for the theoretical prediction in a double-blind design. Similar results are presented in Cherry (2001).

<sup>11</sup> Other experiments find similar effects of asset entitlement. In Gächter and Riedl (2005), bargaining pairs consider a split of resources based on proportional (i.e., relative) performance as more fair than equal split allocations. Sonnegard (1996, p. 372) finds that behavior in bargaining experiments is sensitive to framing effects in which property rights are reinforced by reminding senders of their “right to exploit their bargaining power.”

environment (Konow, 2003; Walster et al., 1978). Thus, reward allocations are affected by the parties' contributions to the generation of total rewards (as discussed in Selten, 1978), implying a role for sunk costs in the determination and application of fairness principles (as in Carmichael and MacLeod, 2003). In our experiments, individuals' decisions over the final distribution of wealth were strongly affected by antecedent earnings behaviors (i.e., the inputs leading to a wealth level which characterizes the decision environment). These behaviors created property rights, the observation of which reflect individuals' attentions to or desire for "just" outcomes. Indeed, McClintock and Keil (1982) argue that when property rights are legitimately and credibly determined in a social exchange environment, equity theory implies the observation of these rights, regardless of the institutional structure enforcing these rights.

In our experiments, it was clear who provided these inputs and (in accord with equity theory) we observed clear behavioral regularities in dictators' decision-making (see Table 1 and Figs. 1–3). However, in more complex environments it is more difficult for decision makers to discern what fairness ideal should apply, particularly when entitlements to wealth and property rights are heterogeneous.<sup>12</sup> These environments become even more complex when efficiency is affected by incentives which, in turn, are a function of individuals' preferences for equity. The key in such environments is determining how equity concerns should be measured. However, once these concerns are properly measured, there is evidence that fairness models can provide good predictions of individual behavior (e.g., Bolton and Ockenfels, 2005; Charness and Rabin, 2002; Engelmann and Strobel, 2004).

## 5. Conclusion

Many aspects of a decision environment influence how individuals perceive fairness in that environment. Our experiments demonstrate how legitimized property rights affect individuals' behaviors and their demonstrated preferences over outcomes. This points to a need to consider the import of asset legitimacy in models of individual decision-making and the measurement of "fair outcomes." Here, legitimizing assets created property rights that individuals readily observed in dictator games. These results should inform models of social preferences and reciprocity by demonstrating an important aspect of how individuals construe fairness and evaluate the welfare of others.

## Acknowledgements

We thank two anonymous referees and an associate editor for suggestions which significantly improved the analysis. We also thank John Boyce, Martin Dufwenberg, Colette Friedrich, and W. David Walls for comments. We thank Mike Campbell, Hugh Finnigan, Kendra McLeish, and Navid Nikou for research assistance. Financial support was provided by the University of Calgary.

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<sup>12</sup> For example, Konow (2000) finds that individuals may interpret fairness in self-serving ways when entitlements are heterogeneous.

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